**Patent claims**

1. A stator for a rotating electric machine for high voltages, comprising a stator, with a stator core and a winding, and a rotor, wherein said stator core is provided with stator teeth extending radially inwards, towards said rotor, **characterized** in that each stator tooth (3) is configured as a number of tooth sections (7) joined axially into a stator tooth plank (2) and that a number of stator tooth planks are fitted together side by side thus forming a section (1A, 1B, 1C, 1D; 31, 32, 33, 34) of a stator core or a complete stator core, and that an electric field is generated which is enclosed within the winding (6; 14; 38) for at least one turn of the winding.

2. A stator according to claim 1, **characterized** in that a number of the sections (1A, 1B, 1C, 1D; 31, 32, 33, 34) of a stator core are joined together in order to achieve a complete stator core.

3. A stator according to any one of the preceding claims, **characterized** in that said winding is provided by means of an insulated conductor (50) which comprises at least one current-carrying conductor (51), a first layer (52) having semiconducting properties provided around said conductor, a solid insulating layer (53) provided around said first layer, and a second layer (54) having semiconducting properties provided around said insulating layer.

4. A stator according to claim 3, **characterized** in that the stator winding is provided by means of a cable, preferably a high voltage cable.

5. A stator according to any one of claims 3-4, **characterized** in that said insulated conductor (50) or said cable is flexible.

6. A stator according to any one of claims 3-5, **characterized** in that said second layer (54) is arranged to constitute a substantially equipotential surface surrounding said conductor.

7. A stator according to any one of claims 3-6, **characterized** in that said second layer (54) is connected to a predetermined potential.

8. A stator according to claim 7, **characterized** in that said predetermined potential is ground potential.

9. A stator according to any one of claims 3-8, **characterized** in that at least two adjacent layers have substantially equal thermal expansion coefficients.

10. A stator according to any one of claims 3-9, **characterized** in that each of said three layers (52,53,54) is solidly connected to the adjacent layer along substantially the whole connecting surface.

11. A stator according to any one of claims 3-10, **characterized** in that said layers (52, 53, 54) are arranged to adhere to one another even when the insulated conductor or cable is subjected to a bending force.

12. A stator according to any one of the preceding claims, **characterized** in that the stator winding (6) is arranged to be inserted between each stator tooth plank (2) before they are fitted together to form a section of a stator core or to form a complete stator core.

13. A stator according to any one of the preceding claims, **characterized** in that the stator tooth (3) comprises a forward tooth portion (4) facing inwards, towards the rotor, when mounted in the stator, and a yoke portion (5) facing outwards, that said stator tooth has two opposite lateral

sides each facing the corresponding side of an adjacent stator tooth, that the lateral sides of the tooth portion (4) facing inwards are provided with slots (8) for the winding and that at least one of the lateral sides of the yoke portion (5) is provided with a lining (13) made of a resilient material.

14. A stator according to any one of the preceding claims, **characterized** in that the stator tooth comprises a forward tooth portion (4) facing inwards, towards the rotor, when mounted in the stator and a yoke portion (5) facing outwards, that said stator tooth has two opposite lateral sides each facing the corresponding side of an adjacent stator tooth, that the lateral sides of the tooth portion facing inwards is provided with slots (8) for the winding, and in that it further comprises a separate lining element (13) of a resilient material which is inserted between the lateral sides of the yoke portions (5) of two adjacent stator teeth.

15. A stator according to any one of the preceding claims, **characterized** in that at least one longitudinal axial notch (22) is arranged in the tooth (3; 35), along its innermost side and facing the rotor, that a key element (23; 44) of a non magnetic material is positioned in said notch in order to prevent lateral oscillations of said tooth and/or the adjacent tooth.

16. A stator according to claim 15, **characterized** in that the notch (22) is provided with a lining of a resilient material.

17. A stator according to any one of the preceding claims, **characterized** in that it comprises compressing means (12; 40,41; 48) for tangentially compressing the teeth (3; 35) of the stator, thereby providing a prestressing at the innermost end of the teeth.

18. A stator according to claim 17, **characterized** in that the compressing means includes a stator frame (12).

19. A stator according to any one of the preceding claims, **characterized** in that the stator core sections (1A, 1B, 1C, 1D) of the complete stator core are held in place by means of an annular stator frame (12), surrounding said core.

20. A stator according to claim 18-19, **characterized** in that the stator core section is provided with a lining (15) of a resilient material on the external side of the yoke portion (5) of said tooth (3), which is in contact with the stator frame (12).

~~21. A stator according to any one of claims 18-20, **characterized** in that the stator frame (12) is provided with a lining (15) of a resilient material on its inward facing surface, which is in contact with the external side of the yoke portions (5) of the stator teeth (3).~~

22. A stator according to any one of claims 18-21, **characterized** in that the stator frame (12) is provided with at least one longitudinal axial opening (17) and that said stator frame includes at least one means (18) for tightening said frame around the stator core (1) by means of reducing said opening.

23. A stator according to any one of claims 18-22, **characterized** in that the stator frame is divided into at least two frame sections (12A, 12B, 12C, 12D), that a longitudinal axial opening (17) is created between the frame sections, and that means (18) are provided connecting the frame sections and for tightening said frame around the stator core (1) by means of reducing said openings.

24. A stator according to any one of claims 22-23 , **characterized** in that said means (17) for tightening the stator

frame includes a bolted joint and that said bolted joint works against the action of the resilient material in the linings (13, 15) and/or lining elements.

25. A stator according to any one of claims 22-24, **characterized** in that the stator frame (12) further includes a springing means (20) associated with said tightening means (18), and that by means of said springing means the opening/openings (17) in the stator frame and the winding slots (8) are automatically adjusted to thermal expansions and contractions of the winding.

26. A stator according to claim 25, **characterized** in that the springing means (20) includes a cup spring.

27. A stator according to any one of claims 17, **characterized** in that the compressing means includes a structure of prestressing means (40), arranged along the circumference of the core (30), and brackets (41) arranged axially for distributing the compressive force to the core.

28. A stator according to claim 27, **characterized** in that the prestressing means includes rods or wires (40).

29. A stator according to any one of claims 27-28, **characterized** in that the external side of the yoke portions (5) of the teeth (3) are in contact with a stator yoke portion (36), arranged along said yoke portions, and that a friction means (37) is provided at the contact surface between said external side of the yoke portions and said stator yoke portion.

30. A stator according to any one of claims 17-28, **characterized** in that the compressing means include at least one clamping ring (48) applied circumferentially around the stator core.

31. A stator according to any one of claims 27-30, **characterized** in that it further comprises a base (42) upon which the core is supported.

32. A stator according to any one of claims 13-31, **characterized** in that the resilient material is rubber.

33. A stator according to any of the preceding claims, **characterized** in that each tooth section (7) and thus each stator tooth plank (2) is provided on both lateral sides with guiding means (9, 10) designed to fit against corresponding guiding means of corresponding shape on adjacent stator tooth planks (2).

34. A method for use in the manufacturing of a stator for a rotating electric machine for high voltages, comprising a stator, with a stator core (1; 30) and a winding (6; 14; 38), and a rotor, wherein said stator core (1; 30) is provided with stator teeth (3; 35) extending radially inwards, towards said rotor, **characterized** in:

- axially joining a number of tooth sections (7) into a stator tooth plank (2), thereby forming said stator tooth (3),
- fitting, side by side, a number of stator tooth planks (2), thereby forming a section (1A, 1B, 1C, 1D; 31, 32, 33, 34) of a stator core or a complete stator core, and
- providing a winding (6; 14; 38) within which a generated electric field is enclosed for at least one turn of said winding.

35. A method according to claim 34, **characterized** in joining together a number of sections (1A, 1B, 1C, 1D; 31, 32, 33, 34) of a stator core in order to achieve a complete stator core.

36. A method according to any one of the preceding claims, **characterized** in providing a winding as described in any one of claims 3-11.

37. A method according to any one of the preceding claims, **characterized** in that

a) an initial fixture element, e.g. in the form of a stator tooth plank (2) or a fixture tooth (46) is removably placed in a manufacturing fixture (45),

b) at least one temporary stator tooth (47) is removably inserted in the fixture (45),

c) a stator winding (6) is inserted on the temporary stator tooth or teeth (47) situated closest to fixture element (2, 46)

d) the temporary stator tooth (47) situated closest to the fixture element (2, 46) is removed from the manufacturing fixture (45), allowing the stator winding (6) placed on the temporary stator tooth (47) to fall or be pressed down and assume its correct position in a first winding slot in the fixture element (2, 46),

e) a stator tooth (3) is inserted into the manufacturing fixture (45) and fitted over the stator winding (6),

f) steps a) through e) are repeated until a section of or a complete stator core has been produced.

38. A method according to claim 37, **characterized** in that each stator tooth plank (2) is glued to a previously fitted stator tooth plank (2) at its yoke portion (5) after step d).

39. A method according to claim 37, **characterized** in that each stator tooth plank (2) is glued to a previously fitted tooth plank (2) at its yoke portion (5) after a section of or a complete stator core has been manufactured.

40. A method according to any of claims 37-39, **characterized** in that during manufacture of the stator the fixture (45) is

rotated about a horizontal axis corresponding to the axial symmetry axis of the stator.

41. A method according to any of claims 37-40, **characterized** in that the stator windings (6) are joined to define the intended number of poles and phases.

42. A method according to any one of the preceding claims, **characterized** in providing a lining (13) of resilient material to the yoke portion (5) of at least one of two opposite lateral sides of a stator tooth (3) facing the corresponding side of an adjacent stator tooth, preferably before the fitting.

43. A method according to any one of the preceding claims, **characterized** in inserting a lining element (13) of resilient material between the lateral sides of the yoke portions (5) of two adjacent stator teeth (3), before or after the fitting.

44. A method according to any one of the preceding claims, **characterized** in inserting key elements (23; 44) of a non magnetic material between the tooth planks (2), at the forward end of the teeth (3; 35) facing the rotor, in notches (22) provided for this purpose in the stator tooth planks.

45. A method according to claim 44, **characterized** in providing a lining of a resilient material inside the notch.

46. A method according to any one of the preceding claims, **characterized** in applying compression means (12; 40,41; 48) for tangentially compressing the teeth (3; 35) of the stator, thereby providing a prestressing at the innermost end of the teeth.

47. A method according to any one of the preceding claims, **characterized** in providing a lining of a resilient material

(15) to the external side of the yoke portion (5) of the stator tooth.

48. A method according to any one of the preceding claims, **characterized** in providing a lining of a resilient material (15) to the inwardly facing surface of a stator frame (12), which enters into contact with the external sides of the yoke portions (5) of the stator teeth (3).

49. A method according to any one of the preceding claims, **characterized** in assembling the stator core sections (1A, 1B, 1C, 1D) into a complete stator core within a stator frame.

50. A method according to any one of claims 47-49, **characterized** in tightening the stator frame (12), which constitutes said compression means, and surrounding the stator core whereby the resilient material (13, 15) is compressed and the winding (14) is pressed against the walls of the slots (8).

51. A method according to any one of claims 34-46, **characterized** in providing a friction means (37) at the contact surface between the external side of the yoke portions of the teeth (35) and a stator yoke portion (36) arranged circumferentially along said external side of the yoke portions.

52. A method according to any one of claims 46 or 51, **characterized** in fitting the core sections together under compression by means of a structure, which constitutes said compression means, comprising prestressing means (40), arranged along the circumference of the core (30), and brackets (41) arranged axially for distributing the compressive force to the core.

53. A method according to any one of claims 46-52, **characterized** in fitting the core sections together under compression by means of applying at least one clamping ring (48), which

constitutes said compression means, circumferentially around the core.

54. A method according to any one of the preceding claims, **characterized** in inserting the winding (6; 14; 38) in the axial direction of the stator core.

55. A method according to any one of the preceding claims, **characterized** in manufacturing the stator on the site of installation of the rotating electric machine.

56. A stator for a rotating electric machine, **characterized** in that it is manufactured in accordance with the method in ~~any one of claims 34-55.~~

~~57. A rotating electric machine for high voltages, including a rotor and a stator according to any one of claims 1-33, or 56.~~

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